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Effect of agricultural policy on succession decisions of farm households

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Abstract Policymakers, economists, and researchers have recently been interested in assessing the impact of farm program payments on the growth and survival of farm businesses. Planning for succession is an integral part of managing a farm business. This study uses farm-level data to investigate the impact of government farm policy and farm growth on both succession decisions and the likelihood of intra-family transfers of the farm business. Results indicate that succession decisions are significantly influenced by government farm policy, farm wealth, age, and educational attainment of current farm operators. Results show that off-farm work by operators and spouses and regional location are positively correlated with non-family farm succession decisions. On the other hand, farm ownership, educational attainment, and marital status of the operator increase the likelihood of family-based succession decisions. However, in the presence of retirement income from other sources such as pension, parents are less likely to have a family successor.

Keywords Agricultural Resource Management Survey · Agricultural policy · Off-farm labor participation · Farm growth · Intergenerational succession · Conditional logit model

JEL Classifications J26 · Q12

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1 Introduction

The number of U.S. farms hafs been declining since 1920 when it reached an all-time high of nearly 6.4 million (*Census of Agriculture*, U.S. Department of Commerce). Today, there are about 2.2 million farms in the U.S. (AIS-84, 2006). While the number of farms has decreased, the average size of farms has increased from 148 acres in 1920 to about 458 acres in 2006. This increased concentration of production agriculture, in correspondence with the decline in the number of farms, is a result of the interaction of multiple institutional and economic forces. Such forces include technological developments, economies of size and capital requirements, forms of ownership, operators' managerial ability, market conditions, price instability, credit financing, off-farm employment opportunities, transportation networks connecting urban to rural areas, government regulations, and commodity programs. With a relatively small number of large operations producing a majority of farm profits, many farmers have sought non-farm income sources or created a value-added product that meets consumer needs (Mishra et al. 2002). Owners of family farm operations are struggling to keep the farm in the family while maintaining their current quality of life during their retirement years.

Agricultural policy through commodity program payments (also known as government payment) has encouraged the propagation of larger farms and may have slowed the rate of exits from agriculture. Barkley (1990) points out that government payments may have indirectly slowed the rate of migration from agriculture through higher land prices. Additionally, Mishra et al. (2002) point out that farm businesses receiving government payments are often large farms, have higher wealth (net worth), and comprised of households that are less likely to have off-farm income. Policymakers, local leaders, and rural communities are extremely concerned about farmers and local agricultural businesses. They believe that population retention and quality of life reflect opportunities and viability of many rural communities which depend on farming and rural population. Farmers support local economies and communities, protect natural resources and sources of food, fiber, and feed and provide industrial components; however, it has been argued that government support, through commodity program payments, has helped in sustaining these rural communities. Recently, policymakers, economists, and researchers have been interested in assessing the impact of farm program payments on the growth and survival of farm businesses. These could also be related to the budgetary pressures and/or international trade negotiations. Nevertheless, interest in growth and survival of farms is a hot topic among many in Washington and on Capitol Hill (recent tax legislation,[1] and 2007 Farm Bill).

Researchers in the field of family business agree that succession is the most important issue that most family firms face. Burkart et al. (2003) underscore the importance of succession in family firms. The authors argue that "a crucial issue in the discussion of family firms from the perspective of corporate governance and finance is succession" (p. 3). Indeed, this could not be said any clearer in discussions about family farm businesses. Gale (1994) points out that entry into

[1] The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA).

farming by the "next generation" holds a place of central importance in the determination of industry structure and total number of farmers and farm families. The Noble Foundation points out that farm succession planning is critical to agriculture. Laband and Lentz (1983) state that farmers are nearly five times more likely to have followed in their fathers' footsteps than any other self-employed proprietors. According to Pesquin et al. (1999), the family farm sector relies heavily on intergenerational succession. Pesquin et al. (1999) also mention additional advantages of intra-family farm succession such as "smooth" transition, reduction in transfer cost, and lower transfer taxes. Additionally, the authors point out intra-family farm succession allows entering farmers to overcome borrowing constraints, at least in commercial farms. Furthermore, a report by the Congressional Budget Office states that a farm or small business can reduce its tax burden by declaring a successor (heir) to the farm or the business. Although studies in agricultural economics (e.g., Barkely 1990; Kimhi and Bollman 1999) have discussed the importance of technology, macroeconomic factors, and taxation in deciding whether to quit or to keep faming, none have investigated the role of government programs (or agricultural policy) on succession decisions. This study uses unique national farm-level data to primarily investigate the impact of government farm policy and farm growth on both the succession decisions and on the likelihood of intra-family transfers of farm families. A subsidiary objective of the study is to investigate also how operator, household, and farm characteristics impact succession and intra-family transfer decisions of farmers. The analysis is conducted with the unique feature of a larger representative sample comprising farms with different economic sizes and that are located in different regions of the United States (see Fig. 1).

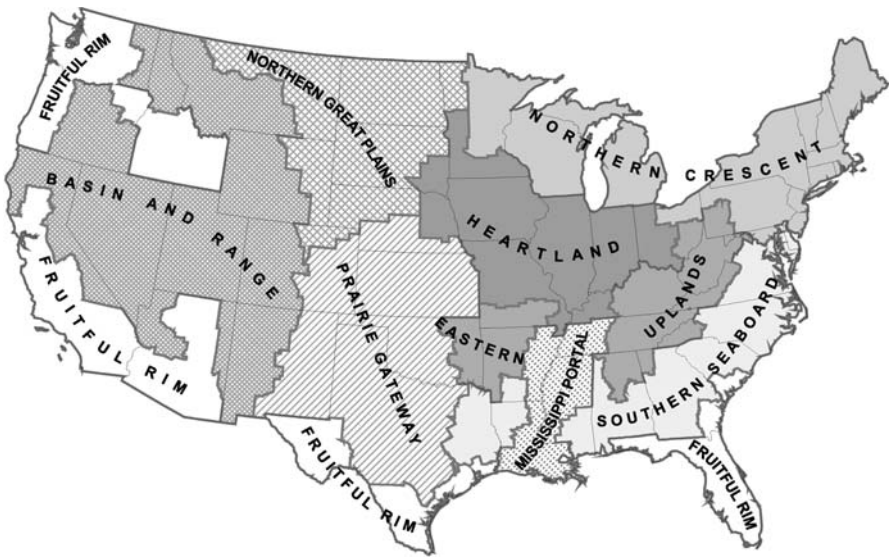

Fig. 1 U.S. farm resource regions

2 Farm succession in the U.S.

Farm succession planning is defined as the process by which the ownership, income, and management of the family business is transferred to the succeeding operator or the next generation.[2] Succession planning is one of the most critical and inevitable issues in the life of any farm family. If the senior owner/operator wishes to continue the farm operation beyond his/her retirement, sustained planning must be undertaken to avoid numerous risks that can reduce the chances that an operation will succeed under new management. These risks include inadequate management training, critical asset diffusion due to a poor estate plan, limited retirement planning requiring liquidation of farm assets, and unsolvable disagreements between the parties. Failure to plan can cause significant business problems, such as the sale of farming assets to settle estates, and family disharmony. Succession planning allows the farmer to anticipate and prepare for future events that may adversely affect farm business management. A good plan takes into consideration: (1) retirement incomes, (2) support for incoming generations, (3) motivation for younger generations, and (4) exploration of off farm alternatives for children who do not wish to pursue farming (Hastings 1985). Others in the profession of agricultural law and agricultural extension (Swan 2001; Boehlje and Eisgruber 1972) believe that a good farm succession plan involves a willingness to transfer some land into the personal ownership of the younger generation—sooner rather than later to ensure that the younger generation has the pride of ownership and incentive to work hard that land ownership brings.

In most Western economies, farmland is privately owned and farmers are free to sell their farms in whole or in part to a family member or a third party. In fact, many states (such as California, Pennsylvania, states in the Midwest, and Virginia to name a few) have a network called "FarmLink" with their own websites that serve as connections between retiring and aspiring farmers. These websites also provide information for intra-family succession and farm transfers. For example, the Farm Transfer Network of New England (FTNNE, http://www.farmtransfernewengland.org) is a network of professionals and organizations that provides farm transfer expertise and support to farm operators in New England states. Another example is North Carolina Farm Transition Network (NCFTN, http://www.ncftn.org), a non-profit partnering organization that provides resources to farm families and owners of rural land across North Carolina who wish to keep their farms in the family. In the U.S., Tauer (1985) notes that when the farm is sold to one child, he/she assumes the mortgage in order to pay his/her parents. On the other hand, when the farm is given to more than one child, one of them often buys the parts of the others.

However, in order to reduce transactions cost and to continue the tradition of farming, the operator of a profitable farm enterprise may have a succession plan and a defined successor. In the U.S., a defined successor indicates that the child will eventually be given full ownership of his/her parents' farm. In many cases, the parents choose a child involved in decision making to be the successor of the farm.

[2] However, wills should not be used as an alternative to succession plans. They should be used to compliment the succession plan.

The declared successor may not have immediate property rights to the farm and would remain subject to the parents' decisions; however, when parents grow old they may transfer the legal ownership of the farm to the child in return for an implicit or explicit obligation to provide them with benefits such as a place to live and supplemental income in their old age. Finally, it should be stressed that the farm could be sold to a third party as one whole unit if the farm does not have a successor within the family. Kimhi and Nachlieli (2001) also provide brief descriptions of succession practices in other economies.

3 Literature review

Despite the importance of family succession in the farm sector, little theoretical and empirical work has been devoted to this issue in agricultural economics. Only a limited number of studies have investigated the reasons and factors affecting the predominance of intergenerational succession within the farm sector (Kimhi and Nachlieli 2001; Weiss 1999; Glauben et al. 2004). Laband and Lentz (1983), as well as Rosenzweig and Wolpin (1985), point out that presence of children and farm-specific experience creates incentive for children to continue farming once the parents decide to quit or retire. Pesquin et al. (1999) point state that intra-family succession provides an implicit contractual insurance arrangement because generations overlap and share income. In investigating farm succession among English and French farmers, Gasson and Errington (1993) conclude that transfer of the farm to the next generation is often a key objective for farmers. Personal attributes of the owner, such as educational attainment, can be important for business survival (Bates 1990; Taylor 1999). The age of the owner may be correlated with knowledge about the firm's competitive abilities. Several authors (e.g., Kimhi and Nachlieli 2001; Glauben et al. 2004) have used personal attributes as variables in explaining succession decisions.

In understanding the farm succession among Irish farms, Kennedy (1991) calls the succession process a "web of exchange relationships" where the successor benefits through the transfer of physical assets while the parents may gain in other ways, such as negotiating for services. Liam Kennedy argues that farm property flows along kinship lines according to criteria dictated by the strategies of the family and its individual members. The author points out that the closed system of transactions insulates heirs from the full effect of market forces in competing for land and related productive assets. Gasson and Errington (1993) state that farm business requires conscious recognition of the family operating it because farming, as it is practiced in most industrialized countries, is predominantly a family business. Thus, considering the attributes of the family is also important in explaining the success (or failure) of the farm business. In the late 20th century, agricultural economists worldwide began to explore the issue of farm succession and retirement issues. Kimhi and Lopez (1999) used the same survey data to investigate the importance of succession considerations for farmers' retirement plans and discovered that retirement and succession decisions in farm households are not separable. Since the early part of the 21st century, some empirical work has

been done to examine various factors affecting the probability and the timing of a family takeover.

In investigating the likelihood of intra-family intergenerational succession on Israeli family farms, Kimhi and Nachlieli (2001) found that age of the operator, level of schooling of the operator, and the age of the oldest child were significant factors in naming an intra-family successor. The authors also found that farms with more land had lower probability of intra-family succession. Glauben et al. (2004), using farm-level survey data from Upper Austria, examined household and farm characteristics affecting farm succession. The authors estimated three different models based on the probability of succession, the likelihood of having a successor, and the timing of succession. The authors discovered that large farms are more likely to be transferred within the family and to have a successor appointed. Further, the probability of succession and of naming a successor first increased with age and then declined again. The above-mentioned studies are limited in terms of both scope of data and/or the region or country of study; none have investigated the impact of government farm policy and farm expansion on succession and intra-family transfer decisions of U.S. farm operators. Finally, while studying the effect of growth rates and firm exit rates, Griliches and Regev (1995) found that a "doomed firm" will have lower growth rates several years before failing and exiting the industry earlier. In this study, variable farm expansion based on data from the 2001 Agricultural Resource Management Survey (ARMS) was used as a dummy variable to capture farm growth between 1996 and 2001. Specifically, farmers were asked if they operated more, the same, or less acreage in 2001 than they did in 1996. Farm expansion takes a value of 1 if the farm operated more acres in 2001 than in 1996.

4 Theoretical background

One can view succession planning through the prism of bequest motives. Recently, McGranahan (2006) discussed and investigated types of bequest motives by looking at will writing decisions for a set of Irish individuals in the early 20th century. Among the motives fitting agriculture are bequests that are motivated by altruism.[3] According to this theory, parents care about the well-being of their children and distribute their assets to maximize the utility of heirs. A distinct feature of this study is that bequests could be an unequal transfer. In our case, the parents care about their children's adult income as well as their own consumption in their latter years. Parents collectively maximize a utility function spanning generations in which utility depends on the number of children, consumption of parents, and the income of children, which enter separately into the utility function.[4]

$$U_p = U_p\left(N, C_p, Y_k^i\right), \quad i = 1\ldots, N, \tag{1}$$

[3] See Becker 1974; Wilhelm 1996 on literature related to intergenerational transfers and altruism motive.

[4] For a comprehensive review of the literature on intrahousehold transfers, see Bernheim et al. (1985).

where N is the number of children; C_P parental consumption, is defined over goods and leisure ($C_P = (x_P, l_P)$); and Y_k^i is the adult income of child i. In practice, Eq. 1 could be considered as a weighted average of parents' utility and the utility of the successor.

In agriculture, succession process could be a solution to a Nash bargaining game (Pesquin et al. 1999). Naming a successor raises potential income and possibly creates an economic surplus that can be shared between the parent and heir or successor. Pesquin et al. (1999) point out that besides sharing income, parents can provide labor and valuable farming experiences and knowledge that could result in higher profits from agriculture. Sharing of profits only occurs once there is succession agreement between the parent and the child. On the other hand, an agreement is only possible if farm income between two generations can make both parties better-off than their second best alternative, which is selling the farm to a third party outside the family. Further, if the child is better off by working off the farm where his marginal returns are higher than what he/she can obtain from farming, then a second best alternative could arise. In this case, the farm could be sold to a third party, and the parents would maximize their utility by investing money in other forms of retirement accounts. In our case, the data is cross-sectional and farm operators were asked if they have decided to exit from farming and if they had a succession plan. Therefore, we focus on the probability that an agreement (succession plan) has been reached prior to the time of the survey. We then link succession planning decision to a number of family and farm characteristics.

To model the succession decision of the farm operator, we follow the framework of Pesquin et al. (1999). The farm household maximizes the value of

$$U_{Pt} + \phi_{t+1|t}\,\mathrm{MAX}\left(\Gamma_{t+1}^{SP}, \Gamma_t^{NP}\right), \tag{2}$$

where U_{Pt} is household utility in period t given no prior decision on succession, and $\phi_{t+1|t}$ is the coefficient of time discount from period t to period $t + 1$. Also, Γ_t^{SP} measures farm household utility level conditional on having a successor. The utility function could be defined as a weighted[5] average of both the parent and the successor utility function. A succession decision is made in period t if the Γ_t^{SP} exceeds Γ_t^{NP}, the present value of utility if a successor is not declared in period t. Both Γ_t^{SP} and Γ_t^{NP} are assumed to have a reduced form presentation in which each is a function of the conditioning variables, those affecting farm income and successors' alternative off-farm income opportunities in all present and future time periods. Let us define Θ_t as the tendency to declare a successor in period t. It is also the difference between Γ_t^{SP} and Γ_t^{NP}. This will also serve as the underlying latent variable in the empirical model described below. The decision to have a succession plan ($I = 1$ if $\Theta_t > 0$; 0 otherwise) and can be estimated by standard binomial logistic regression model (Greene 1997). We will first estimate a logistic model that estimates the succession decision followed by a multinomial logit model estimate assessing the choice of successor.

[5] These weights could be thought of as Pareto weights derived from the bargaining game between the farm operator and the successor.

5 Data

Data for the analysis are from the 2001 Agricultural Resource Management Survey (ARMS), conducted annually by the Economic Research Service and the National Agricultural Statistics Service. Our analysis focuses on a selected 2001 ARMS subsample of 4,161 observations representing more than 1 million farm operator households with operators 45 years or older. In 2001 ARMS, farmers were also queried about whether they had developed a succession plan for their farming operation. Based on this information, we have classified farm operators into two groups: those with a succession plan and those without. All summary statistics of the variables used in the farm succession and in the intra-family farm transfer models estimated using logistic regression (binomial and multinomial logit model, respectively) are presented in Table 1.

The two variables of interest are (1) the expectation of farmers of continued farm support over the next four years since 2001, and (2) whether the farm had grown in size over a period of five years starting in 1996. Figure 2, which plots the kernel densities of both the amount of government payments received by farmers in 2001 and of farm size, respectively, demonstrates the importance of both of these variables to those operators who reported a succession plan. Specifically, farm operators with a succession plan, in contrast to those operators without such a plan, tend to receive on average a bigger subsidy from the federal government ($9,257 versus $6,561; or $19,853 versus $16.693 for participating operators), and tend to operate larger-sized farms (605 acres versus 366 acres). The fact that the distributions of both of these variables are positively skewed and they are likely to be endogenous makes their use in both of the farm succession and the intra-family farm transfer regression models problematic.[6] To mitigate the likelihood of biased and inconsistent estimators resulting from such a problem, expected government payments and expected farm expansion are used instead because both of these variables serve as good proxies for government payments and farm size, respectively.

Another relevant variable of importance to the exit decision in the intra-family farm transfer model, particularly in the U.S., is income earned from passive sources such as disability, military and other retirement payments, Social Security, unemployment, Veteran's benefits, and other public retirement and public assistance. Specifically, while the shares of households in the three categories that delineate the intra-family farm transfer decision are 77.0 percent for "Family succession," 14.4 percent for "Non-family succession," and 8.6 percent for "Exit," the shares of households in these categories that receive this type of income are,

[6] The distribution of government payments has the added problem of preponderance of zero as 53% (61%) of farms whose operators are aged 45 years or older and with a succession plan (without a succession plan) did not receive any payments in 2001. Study by Fletcher et al. (2005) among others; have addressed the problems of skewed data with many zeros in logistic regressions. In terms of consequences and means to mitigate problems of endogenous variables in regression analysis, these issues have been addressed by many studies including Angrist and Krueger (1991).

To mitigate the problem of endogeneity farm wealth is measured in this paper based on its dollar value at the beginning of 2001, or implicitly at end of the previous year (see footnote b, Table 1) thus deeming it to be an exogenous variable in the farm succession model.

Table 1 Definition and weighted means of variables used in the farm succession and in the intra-family transfer models, 2001

Variable definition and symbol	Weighted means[a]		
	No succession plan (1)	Succession plan (2)	All ARMS sample (3)
Age of operator, years	59*	64	60
Education of operator, years	12.96	13.27	13.05
Marital status of operator (=1 if married; 0 otherwise)	0.84	0.81	0.84
Presence of young persons between ages 13 and 18, dummy variable	0.16	0.13	0.15
Farm operator working off the farm, dummy variable	0.16	0.14	0.15
Spouse working off the farm, dummy variable	0.13	0.13	0.13
Both farm operator and spouse working off the farm, dummy variable	0.29	0.23	0.27
Expected government support, dummy variable	0.26	0.31	0.27
Farm expansion or growth, dummy variable	0.15	0.18	0.16
Farm wealth[b] ($100,000)	3.43*	5.09	3.92
Land productivity index (0 = least productive, 100 = most productive)	72.66	72.12	72.5
Farm ownership, dummy variable	0.59	0.6	0.59
Regional dummy variables:[c]			
Farm located in the Heartland region, dummy variable	0.17	0.18	0.18
Farm located in the Northern Crescent region, dummy variable	0.15	0.07	0.12
Farm located in the Northern Great Plains region, dummy variable	0.04	0.06	0.05
Farm located in the Prairie Gateway region, dummy variable	0.14	0.17	0.15
Farm located in the Eastern Uplands region, dummy variable	0.18	0.17	0.18
Farm located in the Southern Seaboard region, dummy variable	0.10	0.10	0.10
Farm located in the Fruitful Rim region, dummy variable	0.11	0.16	0.12

Table 1 continued

Variable definition and symbol	Weighted means[a]		
	No succession plan (1)	Succession plan (2)	All ARMS sample (3)
Farm located in the Basin and Range region, dummy variable	0.04	0.05	0.04
Sample	2,714	1,447	4,161
Population	1,094,574	459,813	1,554,388

[a] The coefficients of variation (CVs) of all non-binary estimates are below 15 percent. * Differences in the means of non-binary estimates across succession plans are statistically different at 5%

[b] The farm wealth variable includes the value of farm land, farm machinery and equipment, breeding stock, and farm buildings (excluding the farm dwelling), 1-1-2001

[c] The base region is the Mississippi Portal

Note: While all ARMS data (column (3)) are used in the farm succession model, only data for those operators who reported a succession plan (column (2)) are used in the intra-family transfer model. In this second stage model, a dummy variable, passive income, if household received income from disability, military and other retirement, Social Security, unemployment, Veteran's benefits, and other public retirement and public assistance; 0 otherwise) with a mean value of 0.15 is added to the set of variables used in the first stage farm succession model

respectively, 14.0 percent, 13.7 percent, and disproportionately at a higher level for households in the "Exit" category, at 23.4 percent. To control for the impact of this income source to the intra-family farm transfer decision, a dummy variable—passive income—is constructed to equal 1 if the household in 2001 received any such passive income, 0 otherwise.

Since the ARMS data has a complex survey design and is cross-sectional, it raises the possibility that the error terms in both logistic models are heteroscedastic. Accordingly, all standard errors were adjusted for heteroscedasticiy using the Huber-White sandwich robust variance estimator based on algorithms contained in STATA (see Huber 1967; White 1980). This type of adjustment for standard errors was used in the regression models in lieu of the Jackknife variance estimation method, which is a method suitable for estimation of standard errors when the dataset has complex survey design (for further detail in the context of the ARMS, Dubman 2000), but when the dataset also is used in full rather than as a subset (i.e., when only operators 45 years or older are included in the sample) as in this paper.

6 Results

The paper first estimates the determinants of having a succession plan and then, conditional on having a succession plan, it estimates the determinants of various possible succession strategies of the farm business. Results pertaining to the first objective are presented in Table 2. Presented in the table are also the corresponding marginal effects of the variables hypothesized to affect farm succession decisions. Based on the pseudo-R^2 and the χ^2, the estimated model demonstrated a fairly good

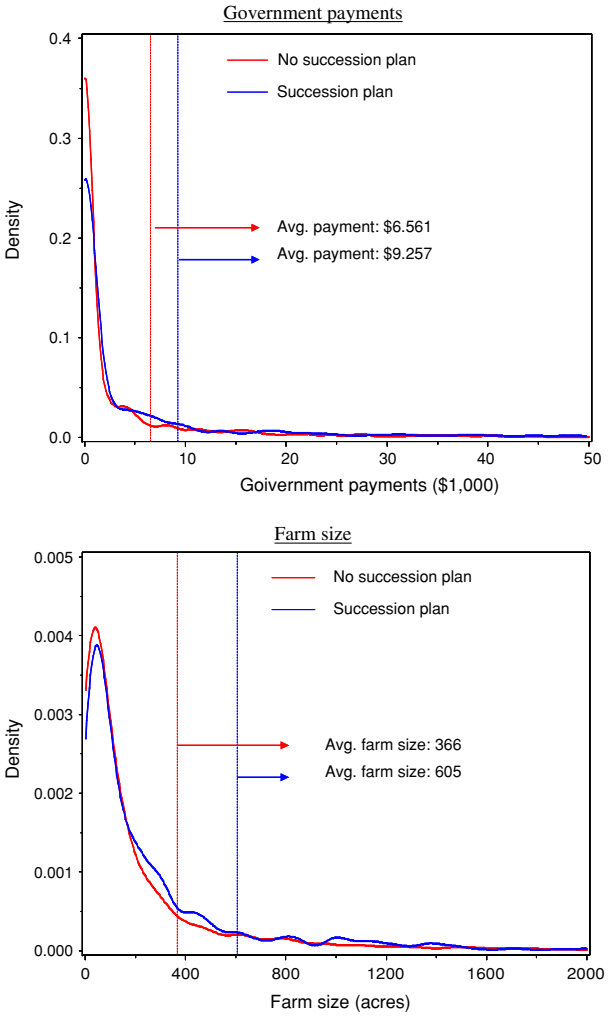

Fig. 2 Kernel density estimates of government payments and farm size by succession plan, 2001

fit. The predictive power of the model classifies 63 percent correctly predicted. The sample for this model is 4,161, representing about 1.6 million farm businesses whose operators are 45 years or older.

Several variables significantly affect the succession decisions of farm operators. Unlike other studies on the issue of succession, this study considers and finds a positive correlation between government payments and likelihood of having a succession plan. This is a significant finding and provides some evidence that farm viability and government payments are linked. Results indicate that farm operators, who are expecting government payments regardless of prices, are more likely to have a succession plan. Based on the continuity of government payments, about 34 percent of farm operators are likely to have a succession plan, compared to only 28

Table 2 Weighted Logistic regression estimates and marginal effects of factors affecting succession decisions of farm operators, 2001

Variables	Estimates		Marginal effects[a]	
	β	Robust standard errors	$\frac{\partial P}{\partial X}$	Standard errors
Intercept	−5.4864***	1.002	–	–
Age of farm operator	0.0513***	0.0079	0.0104***	0.0016
Education of farm operator	0.0629**	0.0287	0.0127**	0.0056
Martial status of farm operator	−0.3322	0.2217	−0.0701	0.0479
Presence of children ages 13–18	0.2067	0.1965	0.043	0.0416
Farm operator works off the farm	0.2995	0.2539	0.063	0.0539
Spouse works off the farm	0.2189	0.2189	0.0457	0.046
Farm operator and spouse work off the farm	0.2732	0.1803	0.0566	0.0391
Passive income	−0.7193	0.3792	0.6183	0.4698
Expected government support	0.2840*	0.1518	0.0588*	0.0327
Farm size expansion and growth	0.3074*	0.1887	0.0647	0.0409
Farm wealth	0.0208**	0.0087	0.0042**	0.0017
Land productivity index	0.0003	0.0064	0.0001	0.0013
Full ownership of the farms	−0.1076	0.1444	−0.0218	0.0296
Farm located in the Heartland	0.5900	0.3806	0.1279	0.0843
Farm located in the Northern Crescent region	−0.0148	0.4767	−0.0029	0.0943
Farm located in the Northern Great Plains region	0.7192	0.4318	0.1624	0.1021
Farm located in the Prairie Gateway region	0.5931*	0.4074	0.1293	0.0910
Farm located in the Eastern Uplands region	0.6311	0.4021	0.1372	0.0903
Farm located in the Southern Seaboard region	0.6305	0.4396	0.1395	0.0985
Farm located in the Fruitful Rim region	1.0054**	0.4238	0.2287**	0.0988
Farm located in the Basin and Range region	0.9620**	0.4372	0.2225**	0.1039
Number of observation:				
Sample: 4,161				
Population: 1,554,388				
Wald $\chi^2 = 89.64$ ($p < 0.001$)				
Pseudo $R^2 = 0.066$				
Association of predicted probabilities of succession and observed responses:				
% Concordant = 62.8				
% Discordant = 36.7				
% Tied = 0.4				

[a] The computation of the marginal effects is done based on Eq. 4

* Significant at 10%; ** significant at 5%; *** significant at 1%

percent of farm operators who are likely to have a succession plan but do not expect government payments (Fig. 3). This result lends support to the finding by Key and Roberts (2006) that agricultural support payments (government payments) have a significant effect on farm business survival. A possible explanation is that government payments increase returns and may also ease liquidity constraint. Liquidity constraints may cause a farm's cost of capital to depend on its wealth. Hubbard (1988) notes that firms' with greater wealth (or net worth) face lower borrowing costs because they have more resources with which they can secure loans and expand farm size. An increase in government payments or, as in our case, having an expectation of continued payments regardless of output price, raises the

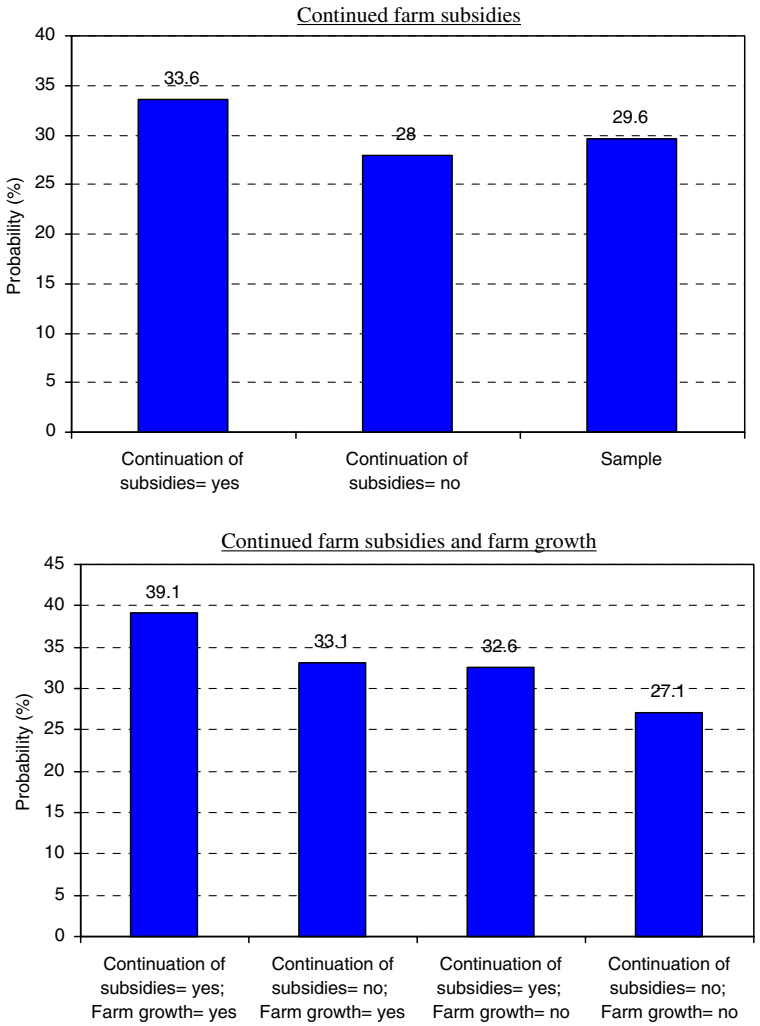

Fig. 3 Likelihoods of having a succession plan by the farm operator by prospects of continued federal farm subsidies and farm growth, 2001

net worth of a farm by means of the positive impact of payments on land values (Goodwin et al. 2002). This, in turn, will contribute to a farm's viability and may even be a factor towards an increase in a farm's size.[7] Further, Mishra et al. (2002) argue that higher government payments reduce the likelihood of financial insolvency and allow farms to remain in business. This factor also makes agricultural occupation more attractive relative to other occupations for the successor, especially if alternative occupations are in different locations or if they require higher human capital and training.

Farm capital stock, which measures the value of farmland, farm machinery and equipment, breeding stock, and farm buildings, at the beginning of the year (January 1, 2001) had a positive and significant effect of the succession decision of farm operators. Larger farms tended to have higher capital stocks, resulting in higher earned incomes for the operators. A further consequence is that farm work becomes more attractive for the successor of the farm business relative to other occupations or relative to working off the farm. Findings are in contrast to Kimhi and Nachlieli (2001), who used land as a proxy for farm size. Furthermore, results are also consistent with the findings of Glauben et al. (2004).[8]

Among the owner attributes, both age and educational attainment of the operator have significant impact on the succession decision of farm households. The probability of having a succession plan is significantly influenced by an operator's education. The coefficient of operator's age is positive and statistically significant at the 1 percent level of significance. The fact that age is positively correlated with business survival is consistent with the studies of firm growth and survival mentioned above. Findings here are consistent with Kimhi and Nachlieli (2001); Glauben et al. (2004). The coefficient of the operator's educational level is positive and statistically significant at the 1 percent level of significance. Results indicate that operators with higher levels of education are more likely to have succession plans. In general, a higher level of education implies greater skills which, if employed for farming, entail a greater farm profitability that renders farming more attractive relative to off-farm jobs for prospective successors and increases the probability of succession. Our results are consistent with the findings of Kimhi and Nachlieli (2001); Kimhi (1995). Contrary to the "shadow of death effect" this study finds a positive relationship between farm growth rate and farm succession. The coefficient of farm expansion is positive and statistically significant at the 10 percent level (Table 2). This result indicates a positive correlation between farm growth and the likelihood of a farm succession decision by the farm operator. This is consistent with the fact that once the operator has decided to increase the size of operation it is very unlikely that he/she will exit farming. Instead, the operator is more likely to have a succession plan in order to make the operation viable in the future. Figure 3 demonstrates that the likelihood of a succession plan is highest when farm growth is combined with an expectation of continued government

[7] Key and Roberts, using Census of Agriculture data find that government payments are positively correlated with the likelihood of farm survival for both large and small farms.

[8] The study by Glauben, Tietje, and Weiss, which used standard gross margins as a proxy for farm size, found a positive and significant effect by farm size on succession decision.

payments (at nearly 40 percent) and is lowest (at 27 percent) when the operator continues to operate the same sized acreage with no prospects of continued farm subsidies.

The off-farm work dummy variables, presence of children between ages 13–18, and the marital status did not have statistically significant effects on the succession decisions of farm operators. However, the parameters of the dummy variables for Prairie Gateway, Fruitful Rim, and Basin and Range all are positive and statistically significant. Results imply that farms located in Prairie Gateway, Fruitful Rim, and Basin and Range are more likely to have a succession plan compared to farms located in the Mississippi Portal region of the U.S. The selected sample for the study shows that farms in the Mississippi Portal region comprise nearly 7 percent of all the farms in the lower 48 states, with farms tending to be relatively small (217 acres) on average and tend to specialize in the production of cotton, rice, poultry, and hogs. In comparison, farms in the Prairie Gateway region comprise 15 percent of all the farms in the sample, tend to be significantly larger (800 acres), and tend to grow primarily commodities that are covered under commodity programs such as cotton, rice, and wheat. Similarly, while farms in the Fruitful region are also larger (372 acres), their main farm specialty is high value crops such as fruits, vegetables, nursery, and commodity crops like cotton. These results are consistent with Kimhi and Nachieli (2001) who found that fruits, vegetable, and other crop farms are likely to have successors. On the other hand, it is likely that the region variables represent the effects of omitted variables that are correlated with regional location (e.g., the intensity of advertising, vicinity to financial markets, Internet providers, and transaction costs) of farm households.

Once the choice of a succession plan has been determined, the choice of a successor follows. The results of the multinomial logit model used to determine the factors contributing to the likelihood of a family or a non-family member succession strategy along with their corresponding marginal effects are presented in Tables 3 and 4, respectively. The effects of the explanatory variables are more easily understood using the partial derivatives that indicate the percentage change in the probability of choosing a particular successor due to a unit change in the relevant explanatory variable. Table 3 provides information on the overall fit of the model. The estimated model demonstrated a fairly superior capability as indicated by a McFadden pseudo-R^2 value of 0.09. In our model, the base group is comprised of farmers who have a succession plan but do not have a designated successor at the time of the survey, and who have also indicated the intention of exiting from farming within the next five years. Thus, the main emphasis here is to investigate the factors that affect succession within the family or to a non-family member compared to farms with a succession plan but with no designated successor.[9]

Table 3 shows that demographic variables such as operator's age and educational attainment, marital status, presence of children between ages 13–18, and off-farm work by operators and spouses have significant impact on the choice of a successor. The impact of the operator's age on the successor choice is mixed. For example, an

[9] The result of the Hausman and McFadden (1984) test for the validity of the IIA assumption pointed towards its acceptance.

Table 3 Multinomial logit estimates of factors affecting the choice of successor in farm transfer, 2001

Variables	(1) Family succession: log (P_1/P_3)		(2) Non-family succession: log (P_2/P_3)	
	θ	Robust standard errors	θ	Robust standard errors
Intercept	2.5344	2.3400	−1.1637	2.9084
Age of farm operator	−0.0138	0.0185	−0.0026	0.0226
Education of farm operator	0.0848	0.0752	0.0499	0.0978
Martial status of farm operator	−0.2124	0.4313	−1.2899*	0.6709
Presence of children ages 13–18	0.9311	0.6009	1.4343**	0.6385
Farm operator works off the farm	1.5364*	0.8457	1.8987**	0.9443
Spouse works off the farm	−0.7438*	0.4439	−0.1369	0.5965
Farm operator and spouse work off the farm	0.4140	0.6384	1.3827*	0.7447
Expected government support	−0.7193*	0.3792	−0.6183	0.4698
Farm size expansion and growth	0.9293**	0.3956	1.4342***	0.4453
Farm wealth	0.3374	0.4945	0.3299	0.5925
Land productivity index	−0.0209	0.0141	−0.0248	0.0197
Full ownership of the farms	−0.0199	0.0153	0.0042	0.0196
Farm located in the Heartland	0.1828	0.3216	0.1364	0.3899
Farm located in the Northern Crescent region	0.5869	0.6843	0.5764	0.8924
Farm located in the Northern Great Plains region	1.2235	0.8811	0.6498	1.1198
	0.5822	0.8601	1.1028	1.0339
Farm located in the Prairie Gateway region	0.3935	0.7007	0.4079	0.9419
Farm located in the Eastern Uplands region	0.7413	0.6765	1.3877	0.9848
Farm located in the Southern Seaboard region	2.4428**	0.9572	2.8449**	1.1813
Farm located in the Fruitful Rim region	1.0811	0.7381	1.0696	0.9702
Farm located in the Basin and Range region	1.1938	0.8291	2.2919**	1.0449
Number of observation:				
Sample: 1,447				
Population: 459,813				
Log likelihood (intercept only): −999.580				
Log likelihood (full model): −910.837				
Pseudo $R^2 = 0.089$				

P_1, P_2, and P_3 are the probabilities of the household of having family succession plan, of having non-family succession plan, and of having a plan of farm exit, respectively (see Eq. 7). Robust standard errors can be obtained from authors upon request

* Significant at 10%; ** significant at 5%; *** significant at 1%

additional year decreases the likelihood of a family-succession by 0.2 percent; however it increases the likelihood of non-family succession by 0.1 percent (Table 4). Results in Table 4 show that an additional year of schooling by the farm operator increases the likelihood of a family-based succession by almost 0.9

Table 4 Predicted marginal effects (averaged over individuals) of factors affecting the probabilities of intra-family farm transfer, 2001[a]

Variables	(1) Family succession	(2) Non-family succession	(3) No successor designated
Intercept	0.5226	−0.3681	**−0.1546**
Age of farm operator	**−0.0020**	**0.0011**	0.0009
Education of farm operator	**0.0089**	−0.0029	−0.0061
Martial status of farm operator	**0.1209**	**−0.1489**	0.0280
Presence of children ages 13–18	−0.0107	**0.0695**	−0.0588
Farm operator works off the farm	0.0212	**0.0544**	−0.0757
Spouse works off the farm	**−0.1181**	**0.0620**	0.0561
Farm operator and spouse work off the farm	−0.0932	**0.1316**	−0.0384
Passive income	**−0.0645**	0.0019	0.0625
Expected government support	0.0067	**0.0651**	−0.0718
Farm size expansion and growth	0.0218	0.0025	−0.0242
Farm wealth	−0.0010	**−0.0006**	0.0016
Land productivity index	**−0.0036**	**0.0024**	0.0013
Full ownership of the farms	**0.0164**	−0.0031	−0.0133
Farm located in the Heartland	0.0349	0.0042	−0.0390
Farm located in the Northern Crescent region	**0.1119**	**−0.0457**	−0.0662
Farm located in the Northern Great Plains region	−0.0282	**0.0702**	−0.0420
Farm located in the Prairie Gateway region	0.0223	0.0052	−0.0275
Farm located in the Eastern Uplands region	−0.0333	**0.0874**	−0.0541
Farm located in the Southern Seaboard region	0.0389	**0.0626**	−0.1015
Farm located in the Fruitful Rim region	0.0588	0.0071	−0.0659
Farm located in the Basin and Range region	−0.0988	**0.1701**	−0.0713

[a] The computation of the marginal effect for a continuous variable is done based on Eq. 8. For a dummy variable, the marginal effect is computed as the difference in the probability of choosing a particular farm succession strategy when the value of the binary variable is 1 and when it is 0 (see footnote 8 for more detail)

Bolded numbers indicate statistical significance at 10% (or better) significance level

percent. Again, this result may indicate that farm operators have better knowledge, abilities, and skills that make farming a profitable and attractive business for the family successor compared to other alternative occupations. Findings here are consistent with those reported by Kimhi and Lopez (1999). The impact of marital status on family and non-family-based successor is positive and negative, respectively, and is statistically significant. As expected, operators who are married tend to favor family successors (12 percent) and are less likely to have non-family succession (15 percent).

Contrary to expectations, results indicate that farm households with children between the ages of 13–18 are more likely to have non-family successors. In the absence of educational attainment by these children, a possible explanation is that these children may want to attend college and may in fact have interests outside

agriculture with the belief that they can earn higher incomes by working off the farm. Children's educational levels are often correlated with the parents' educational levels and may act at raising their expected off-farm wages, and hence, may render them less eager to take on the farm. A dummy variable that indicates the off-farm work status of the farm family was included in the regression. Results in Table 3 indicate that the likelihood of a non-family succession decision, relative to an exit decision, is higher when both operator and spouse work off the farm. Results in Column (2) of Table 4 pertaining to marginal effects indicate that probability of a non-family succession increases by 13 percent if both the operator and the spouse work off the farm. One explanation is that households where both farm operators and spouses work off the farm may choose to live in rural areas and operate a business that qualifies as a farm. Many may have come into farming after beginning their off-farm job (Mishra et al. 2002). Others may have moved from farming to off-farm work and may exit the industry. These households might be expected to have a weaker tie to their farms than households that are engaged in farming as their primary source of income. The marginal effect of only spouses working off the farm is negative and statistically significant (Table 4) for a family-based succession decision and positive and significant for a non-family-based succession decision. Results in Table 4 indicate a decrease in the probability of a family succession of about 12 percent and an increase in the probability of a non-family succession by 6 percent if only the spouse works off the farm. Finally, the marginal impact of operator working off the farm is positive and statistically significant at the 10 percent level, or better, of significance (Table 4) in the case of non-family-based succession. A possible reason could be that an operator with non-family-based succession might mainly work off the farm as a prelude to exiting from farming.

For many farm households, the farm is the only source of retirement income. The choice of a successor may have a bearing if an alternative source of income such as "passive sources of income" (e.g., Social Security, income from disability, and other public retirement programs and assistance) is available to the retiring farm couple. As one reviewer pointed out, the presence of such an income source reduces the financial insecurity of retired farm couples. Results in Table 3 show a negative and statistically significant impact of presence of passive income on the likelihood of family succession. Column (10) of Table 4 shows that the likelihood of a family-based succession decreases by 6 percent if the farm household reported to have received passive income. Figure 4 shows that likelihood of family and non-family succession based on the continuation of government program payments (or farm subsidies) and the combination of farm subsidies and farm growth. In all cases, the probability of family-based succession dominates the non-family and no designated successor (or exit, as we have defined here) plans. The marginal impact of continuation of government program payments, the variable denoting expected government payment regardless of farm prices, is positive and statistically significant in the choice of non-family successor (Table 4, Column (2)). This result suggests that as long as the farm operators feel that government programs will continue they will continue to farm, but the choice of managing the farm could be a non-family member. If a family member is not ready to take over the farm, they would declare a non-family member as a successor in anticipation of continued

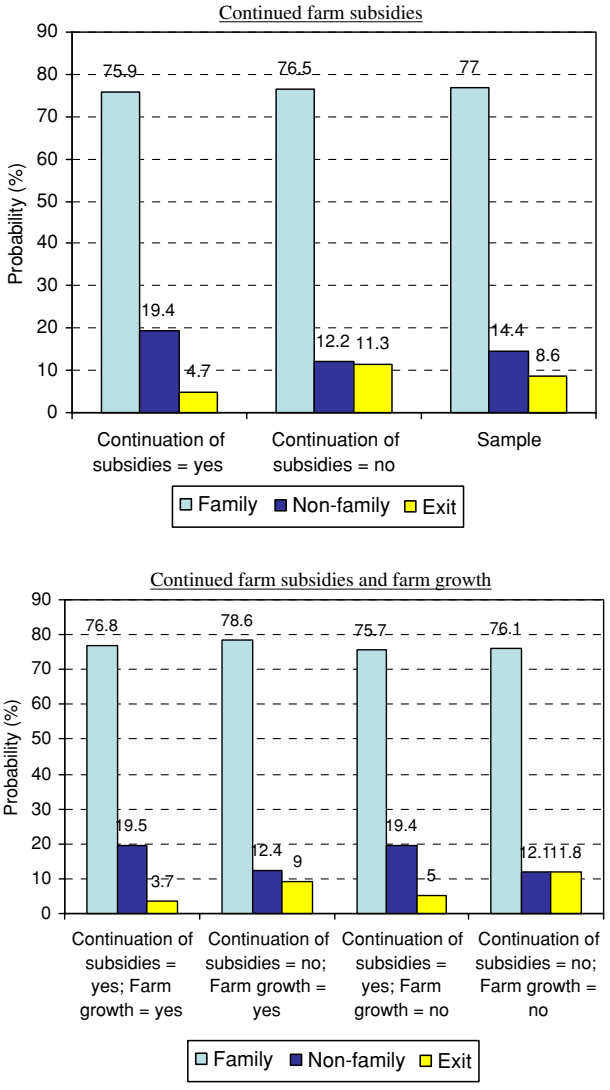

Fig. 4 Likelihoods of having an intra-family succession plan by the farm operator by prospects of continued federal farm subsidies and farm growth, 2001

government payments which tend to get capitalized into higher rents and/or higher land values.

Results in Table 4 shows that the marginal impact of capital stock on the likelihood of a non-family succession is negative and statistically significant. Again, higher capital stock is correlated with large farms and large farms hold best the prospect for making a living out of farming and the expected higher income makes working on the farm more attractive for children relative to off-farm work. Results in Table 4 also indicate that farmers operating productive land, particularly those

with children who are not interested in farming, see previous results on presence of young persons between 13–18, column (2) are more likely to have a non-family succession. In a contractual agreement with a non-family successor, they can derive compensations/income in their retirement years. More productive land usually has higher rental price and can be used for growing program crops (Gardner 2002). Farm ownership is another important variable that affects family based succession. Results indicate that if the farm is fully owned the likelihood of family based succession increases 1.6 percent compared to all other forms of ownership (Table 4). Land ownership reflects the value of the farm and thus of the inter-generational transfer. Further, one can argue that ownership of more land can also make it easier to overcome liquidity constraints and thus reduce development restrictions in the future.

Finally, regional location of farms has impact on the choice of successor of the farm. Farms located in the Northern Crescent region of the U.S. are 11 percent more likely to have family-based successor and about 5 percent less likely to have a non-family-based successor compared to farms located in the in the Mississippi Portal region (base group). The Northern Crescent region is the most populous region of the U.S., and farms in that region tend to specialize in dairy farming and in high value crops such as fruits and vegetables and organic farming. Findings here are consistent with Pesquin et al. (1999) and Kimhi and Nachlieli (2001). Farms located in the Northern Great Plains and in the Eastern Upland regions of the U.S. are 7 and 9 percent, respectively, more likely to have a non-family successor compared to farms located in the in the Mississippi Portal region. Farms in the Northern Great Plains (8 percent of farms in the sample) are often large wheat farms and tend to receive government payments. On the other hand, farms in the Eastern upland (10 percent of farms in the sample) are small farms and tend to operate part-time cattle farms, mixed with tobacco and poultry farms. Farms located in the Southern Seaboard are 6 percent more likely (Column (2), Table 4) to have a non-family successor compared to farms located in the Mississippi Portal region (base group). In general, farms located in the Southern Seaboard region comprise about 10 percent of total farms in the sample with a mix of small and large farms specializing in part-time cattle, field crops, and poultry. Finally, results based on marginal effect indicate that farms located in the Basin and Range region are 17 percent more likely to have a successor who is not a family member compared to farms located in the Mississippi Portal region (base group).

7 Summary and conclusions

This paper examined the factors that affect farm succession decisions of farm operators over the age of 45, with particular attention to the impact of government program payments and farm expansion. Using a binomial logit model and farm-level data, the study found that indeed farm programs payments and the decision to expand the farm significantly influence succession planning of farm operators. Additionally, conditional on the succession decision, the paper also investigated the impact of various factors on the choice of successor within the family or non-family.

The study identified a number of significant attributes whose effects are consistent with theory and empirical evidence from other economies. In particular, the study found that the likelihood of having a succession plan increases with expected government farm program payments, farm wealth, age, and educational level of the farm operator. In addition, farms located in the in Fruitful Rim and Basin and Range regions are more likely to have a succession plan compared to farms located in the Mississippi Portal region.

Conditional on having a succession plan, the study also investigated factors that influence the choice of the successor, namely, whether the successor is a family or a non-family member. The study identified a number of significant variables that affect the choice of successor. If the farm household had children between the ages of 13–18, then it was more likely that the successor would be a non-family member. Combined with the notion that their children were not taking over the farm, but in the presence of government program payments, results indicate that expected government farm program payments increased the likelihood of a non-family successor. On the other hand, married farm operators were likely to have a successor designated from within the family. Off-farm work by operators, spouses, or both increased the likelihood that the successor would be a non-family member. The presence of alternative sources of income, for example, retirement income from passive sources (income from disability, military, and other retirement, Social Security, unemployment, Veteran's benefits, and other public retirement and public assistance) decreased the likelihood of a family successor. This result is contrary to the altruistic motives and casts doubt on the conventional wisdom that many farmers may be treating the farm as a source of retirement income.

In terms of policy relevance, the study indicates that government farm policy may be responsible for keeping farms in the business of farming and, in the process, aiding in having the payments capitalized into the farmland. One can argue that by reducing market risk, government farm programs create a disincentive for farmers to leave the industry. Increased farmland values and increased rental rates are impediments to entry and exit and give rise to absentee ownership. Further, these payments may have implications on farm structure. This issue is becoming more relevant as farm size and absentee ownership continue to increase and the number of family farms dwindles. The presence of passive income sources for retiring parents would result in less incentive to transfer the farm within the family. This may create a competitive environment and perhaps less efficient farms will exit the industry. This may also provide an entry point for young and beginning farmers to enter the industry. Finally, one can argue that the general economic conditions (off-farm labor markets) are more important to farm households. Off-farm work can provide income to parents in their latter years and may have implications on succession decisions and ultimately on farm policy and the structure of agriculture.

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